

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 3]

[1916

XI.—THE FLORA OF MADRAS.

The Flora of Madras, of which the opening instalment (pp. 1-200) dealing with the natural families *Ranunculaceae* to *Aquifoliaceae* has been issued, forms one of the series of local Indian Floras, the preparation of which was undertaken on the completion of the *Flora of British India* prepared at Kew by Sir J. D. Hooker during 1872-97. The author, Mr. J. S. Gamble, who was compelled to defer the inception of the task owing to his having undertaken to collaborate with the late Sir G. King in the preparation of the *Materials for a Flora of the Malayan Peninsula* and to his public spirited determination to continue that work after the death of his colleague is, by reason of his service in the Madras Presidency during his career as an Indian forest officer and his personal knowledge of the vegetation of a considerable portion of the area dealt with, especially competent to carry this new undertaking to a successful issue. That he has been able to supply a substantial instalment so soon is due, as the author explains in the introduction to Part I. to the circumstance that he had the assistance of Mr. S. T. Dunn, formerly Superintendent of the Botanical and Forestry Department, Hong Kong, in preparing the draft of the botanical portion of the first 132 pages, to the end of *Biophytum*, and that for the genus *Impatiens*, which follows, the results of the patient study to which Sir Joseph Hooker devoted the last years of his life were available for use. Owing to his other engagements the assistance of Mr. Dunn is no longer available and the rest of the task is therefore being undertaken by Mr. Gamble alone.

The method of presentation adopted is that followed in the corresponding work for Bengal, issued in 1903. The object of that method is to enable the ready identification of a species in the field by enabling the collector to ascertain with certainty the genus to which a plant belongs and, this object attained, by limiting his attention to those characters of the plant under

examination which are necessary to its specific determination. This method has the advantages of saving space and time, both matters of consequence to the traveller. The work is exceedingly well printed and an examination of its descriptions and keys indicates that it should serve its special purpose well.

The preparation of an account of the species of any *Flora* dealt with in a fashion so succinct as that adopted in the *Flora of Madras* does not lessen the need for critical examination of the material on which it is based, but places an author at a disadvantage in cases in which he is compelled to adopt conclusions at variance with those arrived at by earlier workers with less adequate material at their disposal. These new conclusions can only be stated; to discuss the reasons on which they are based would be to defeat the very object which the method of presentation adopted has been devised to fulfil. At the same time it is often desirable that these reasons should be disclosed for the guidance of cabinet- as contrasted with field-botanists. In the present instance those cases in which new conclusions have been arrived at in that portion of this work drafted by Mr. Dunn, have been noted by him for Mr. Gamble's information and we are indebted to Mr. Gamble for the present opportunity of placing these on record.

NOTES ON THE FLORA OF MADRAS (S. T. DUNN).

RANUNCULACEAE.—*Clematis smilacifolia*, Wall. The S. Indian forms formerly referred to this name appear from the material now available to represent three species, one agreeing with Wallich's type, a second with Wight's *C. Munroana*, while the third, collected by C. B. Clarke in the Nilgiri Hills, has been described in the *Kew Bulletin* as new under the name of *C. theobromina*, Dunn (*K.B.* 1914, 181).

Roxburgh's original spelling of *C. gouriana* is with a small *g*, and, as his note "in the environs of the ancient city of Gour, it forms with *Porana paniculata* extensive, lovely festoons" (*Fl. Ind.* ii. 671) shows that the specific name is geographical, his spelling, according to the Vienna Rules, should be maintained.

Ranunculus diffusus, DC. A full series of the S. Indian Buttercups formerly referred to this name corroborate the view adopted by Wight and Arnott (*Prodr.* 4) that they represent a distinct species—*R. subpinnatus*, W. & A.

ANONACEAE.—*Cyathocalyx zeylanicus*, Champ. The petals in Champion's Ceylon specimens (the type) and in those from S. India are $\frac{1}{2}$ in. wide not $1\frac{1}{2}$ in. as stated in the *Flora of British India* (i. 53).

Polyalthia rufescens, Hook. f. & Thoms. The fruit of this species has not been described. The nearly mature carpels in a specimen in the Madras Herbarium collected in the Tinnevely Hills are pisiform, $\frac{1}{8}$ — $\frac{3}{10}$ in. in diameter and borne on stalks of about the same length.

Miliusa eriocarpa, Dunn, sp. nov. The common S. Indian tree described under the name of *M. indica* by Hooker f. and

Thomson (Fl. Ind. 148; Fl. Brit. Ind. i. 86) and by Wight and Arnott (Prodr. 10) and figured by Beddome (Pl. Ind. Or. t. 85) has been shown to me by Mr. J. R. Drummond to differ in so many respects from the figure and description of Leschenault's true *M. indica* (Lesch. in A. DC. Mém. Soc. Genève. v. 36) that it is necessary to distinguish it under a separate name. As no such name has yet been published, I propose, with Mr. Drummond's concurrence, to call it *Miliusa eriocarpa*, Dunn, in reference to its velvety carpels.

MENISPERMACEAE.—*Tiliacora acuminata*, Miers. The first description of the species was published by Lamarck under the name of *Menispermum acuminatum* (Encycl. iv. 101). Diels is, therefore, correct, under the Vienna rules of nomenclature, in restoring this specific name (Engl. Pflanzenr.—Menisp. 60). He attributes the combination, however, to Hooker f. and Thomson, but it was previously used by Miers (Ann. Nat. Hist. ser. 2, vii. 39).

Diploclisia glaucescens, Diels. This genus of Miers is revived by Diels for reasons clearly expressed in Engler's Pflanzenreich (Menisp. 224) and his new combination must be used. The species was first published under the name of *Cocculus glaucescens* by Blume (Bijdr. (1825) 25).

For similar reasons Diels rightly re-established (l.c. 236 and 237) the oldest specific names in *Cocculus hirsutus*, Diels (*Menispermum hirsutum*, Linn. Sp. Fl. ed. 1, (1753) 341) and in *C. pendulus*, Diels (*Epibaterium pendulum*, Forst. gen. (1776) 108), plants for long known as *C. villosus*, DC. and *C. Leaeba*, DC.

Stephania.—There are two species of this genus in the Madras area; one with flowers in umbellate heads, the other with solitary axillary heads or with condensed head-like cymes of flowers. The latter agrees perfectly with Arnott's type of *Clypea Wightii*, which consists of specimens bearing male flowers and ripe fruits, and is obviously distinct from Loureiro's *S. rotunda* with which, probably in consequence of the scantiness of the material, it was previously identified. The new combination of *S. Wightii* is therefore proposed for it. A slight disagreement with Diels's conclusions must be here noted: Diels (l.c. 272) places *Clypea Wightii*, Arn. under *S. glabra*, Miers, a species described by him (Diels) as having "*flores filiformi-pedicellati*." In Wight's own specimen (no. 2462) in the Kew herbarium there is a detached male inflorescence, however, which is a peduncled head, and similar ones are in their natural position in the Calcutta specimen (Kew Dist. 45). Wight himself describes the male flowers as being "all collected into a single capitulum" (Ill. i. 22). Arnott's species cannot therefore, I think, be so placed, but must be provided with a distinguishing name in the genus as above. The other S. Indian species resembles *S. hernandifolia*, with which *S. japonica*, Miers, is closely allied. Diels (l.c. 277, 279) regards these two species as distinct by reason principally of their amount of or want of pubescence, *S. japonica* having glabrous inflorescences and leaves, while *S. hernandifolia* has puberulous inflorescences and leaves usually

tomentose on the veins. If kept separate on this account our plant is *japonica*, and if the two are combined, the same specific adjective must be used as having priority, the original description of the species in this sense being under the name of *Menispermum japonicum*, Thunb. (Fl. Jap. (1784) 195).

Cyclea.—There appear to be three species of *Cyclea* in S. India, very similar in habit and in foliage, but differing in the structure of their male flowers. By far the commonest and most widely diffused has globose or widely campanulate pubescent calyces, with 6-8 anther-cells on the rim of its peltate connective. This is the species described as *C. Burmanni*, Miers, in the Fl. Brit. Ind. i. 104. Miers did not use the combination in the place cited and Hooker f. and Thomson (Fl. Ind. 201) are the real authorities for this name, which is founded on *Cocculus Burmanni*, DC. (Syst. i. (1818) 517). But Diels, who had the opportunity of comparing a type with van Rheede's Malabar specimen previously described as *Menispermum peltatum* by Lamarck (Encycl. iv. (1797) 96) considered the two to be identical, and, as Rheede's figure (Hort. Mal. vii. t 49) quite agrees with this conclusion, Lamarck's specific name should be the one used. *Cyclea Burmanni*, Hook. f. & Thoms. and *Cyclea peltata*, Diels are synonymous and the fact that the combinations have been variously applied to three very different species in all the important works dealing with them during the last forty years has prepared the way for a complicated synonymy.

The combination *C. Burmanni* was applied by all authors up to the time of Diels's Monograph to the common globose-flowered species; to the second species having campanulate calyces and 4-5-celled androecia Hooker f. and Thomson wrongly applied the name *C. peltata*, while Miers (Contrib. iii. 236) used the same combination, also wrongly, to designate a third species having the male calyx divided nearly to the base into 4-5 segments. The second species received the distinctive name of *C. Arnottii* from Miers (Contrib. Bot. iii. 238), while for the third which was collected by Beddome in the Wynaad and has not previously been separately recognised, I propose the name *C. fissicalyx*.

The synonymy, as far as references to Madras plants are concerned, will be as follows:—

C. peltata, Diels, as in Engl. Pflanzenr. Menisperm. 312 omitting the synonym *C. Arnottii*, Miers.

C. Arnottii, Miers in Ann. Nat. Hist. ser. 3, xviii. 19, Contrib. iii. 238.—*C. peltata*, Hook. f. & Thoms. Fl. Ind. 201, Fl. Brit. Ind. i. 104; Diels l.c. 312 all in part.

C. fissicalyx, Dunn.—*C. peltata*, Miers, Contrib. iii. 236; Cooke, Fl. Bomb. i. 24 (not of Hook. f. & Thoms. nor of Diels).

BERBERIDACEAE.—*Mahonia Leschenaultii*, Takeda. The S. Indian plant is probably specifically distinguishable from De Candolle's *M. napaulensis* by its globose glaucous-purple berries.

NYPHAEACEAE.—*Nymphaea Lotus*, L. Conard does not in his Monograph identify any Indian plants with the *N. Lotus* of

the Linnean herbarium but he follows Wight and Arnott (Prodr. i. 17) in separating from it as distinct species, on account of the colour of their flowers, *N. rubra*, Roxb. and *N. pubescens*, Willd. After examining a large series of S. Indian Water-lilies, it is not considered possible to separate these two species, but they are distinct from *N. Lotus*, L. by the densely velvety under-surface of their leaves.

CRUCIFERAE.—*Cardamine trichocarpa*, Hochst. ex Rich. Tent. Abyss. i. 18 (1847) is identical with the Indian plant described afterwards as *C. subumbellata*, Hook. by Hook. f. & Anders. in Fl. Brit. Ind. i. 138 (1872). The latter name must therefore be superseded.

CAPPARIDACEAE.—In accordance with the present International Rules of nomenclature, *Niebuhrria linearis*, DC. and of most subsequent authors must have the original specific name of *apetala* (*Capparis apetala*, Roth, Nov. Sp. 238) restored, becoming ***Niebuhrria apetala*, Dunn.**

Capparis aphylla, Roth. A type specimen collected at Palamcottah (Tinnevely) on Oct. 26th, 1795, is in the Kew Herbarium.

C. grandiflora, Heyne. There is a form similar in all respects to the Wallichian type of this species except that the thorns are nearly straight and the twigs glabrous. But the only two specimens known to me are one in the Oxford Herbarium collected by Bulkley in 1703 at Fort St. George (Madras) and a second collected by Heyne in Mysore in 1801, and these are not sufficiently complete to admit of accurate description.

C. stylosa, DC. This is the Caper with straight thorns, flowers 2-5 in. across and large mucicarp fruit which was figured by Wight (l.c. t. 889) under the name of *C. divaricata*, Lam. Subsequent writers have followed this nomenclature. Lamarck had neither flowers nor fruit when describing his species, and it so happens that there are two S. Indian *Capparis* hardly distinguishable by their leaves and thorns but readily seen when in flower or fruit to be quite distinct. Lamarck mentions that in *C. divaricata* "Les aiguillons sont géminés, courts et crochus" (Encycl. i. 606) which would tend to show that it did not belong to the species figured by Wight and described by subsequent writers under that name. But, in any case, it is only safe to designate these two allied species by the names given to them afresh after flowers or fruit were known. The first name which can be definitely claimed for the large-flowered and rough-fruited kind is *C. stylosa*, DC. (Prodr. i. 246) the synonymy being *C. divaricata*, Wight & Arn. Prodr. i. 27; Wight l.c. t. 889; Hook. f. & Thoms. in Fl. Brit. Ind. i. 174. Similarly the second may safely be cited as *C. diversifolia*, Wight & Arn. Prodr. i. 27; Hook. l.c. Fl. t. 181; Hook. f. & Thoms. Fl. Brit. Ind. i. 175. *C. divaricata*, Lam. l.c. (possibly).

***C. Cleghornii*, Dunn sp. nov.—*C. Roxburghii*, Cooke, Fl. Bomb. i. 46 (exclud. syn.); Hook. f. & Thoms. in Fl. Brit. Ind. i. 175 (partly) not DC. Bombay Presidency: Canara, Stocks. Madras Presidency: Balabroydroog (?) *Cleghorn*;**

Wight, Kew Distrib. No. 68; Mangalor, *Hohenacker* 420; Coorg, *Hook. f. & Thoms.* Madras Coll. 72.

Distinguished from its nearest ally *C. Roxburghii*, DC. by its tomentose flower buds and divaricate leaf-veins.

C. grandis, Linn. f. This species was described from a Ceylon specimen with nearly glabrous leaves, but the usual form in S. India has a covering of close olive-green tomentum over all the young parts.

C. tomentella, Dunn sp. nov.—*C. parviflora*, Bedd. l.c. Pl. Ind. Or. i. 65 t. 176 (not of Hook. f. & Thoms.).

Travancore, *Beddome* 61, 243.

This species may be distinguished from *C. parviflora*, Hook. f. & Thoms. by its densely shortly pubescent (not glabrous) twigs and by its fully grown flower buds being .2 in. instead of .1 in. long.

C. rotundifolia, Rottl. Rottler first described this species (*Gesellsch. Nat. Fr. Neue Schr.* iv. (1803) 185) and after comparing this type, which is still extant in the Kew Herbarium, there seems no doubt that his plant was the one subsequently labelled *C. pedunculosa* by Wallich (n. 6999), described and figured in *Hooker's Icones* (t. 128), and quoted by most later writers.

Capparis zeylanica, Linn. The first species of *Capparis* to receive a binominal designation was the common hook-thorned species of Ceylon and S. India which has 2 or more flowers in supra-axillary rows and globular glabrous ovaries. It was collected by Hermann in Ceylon and came with his herbarium into the hands of Linnaeus, after being lost to the botanical world for about 70 years. This herbarium formed the foundation of the *Flora Zeylanica*. The collection consists of fragments of plants glued into 5 large volumes which now stand on the shelves of the Botanical Department of the Natural History Museum (Cromwell Road). They are the actual volumes referred to by Linnaeus as "*in forma atlantica*" (atlas folio) in the preface to the flora, and the specimens are his types. Specimens of the Caper named by him as above (*Sp. Pl.* ed. 2, 720 (1763)) occur twice in the herbarium and although two and a half centuries old are still in quite good condition and easily recognisable as the species afterwards known as *C. horrida*, Linn. f. The younger Linnaeus received specimens of the same species from Koenig and presumably not having seen Hermann's herbarium, and there being no specimen in his father's herbarium, published it again in 1781 under the latter binominal. This name was doubtless communicated to Koenig and became the recognised appellation of the Caper among his friends and their successors. Roxburgh reverted to the correct name, but Wallich, Wight and Arnott and all recent writers have followed the mistake of the younger Linnaeus.

But not only did the early botanists of S. India fail to apply Linnaeus's name to the common plant intended by him, they used it to indicate a perfectly distinct species. The mistake was followed by Willdenow, Wallich and most modern authors.

But De Candolle for the first time recognised that it really was a distinct species and gave it the name of *C. brevispina* and this name, which was adopted by Wight and Arnott and other botanists must stand. The synonymy will be as follows:—

C. brevispina, DC. Prodr. i. 246; Wight & Arn. Prodr. i. 24; Hook. l.c. Pl. t. 126. *C. zeylanica*, Hook. f. & Thoms. Fl. Brit. Ind. i. 174.

C. zeylanica, Linn. Sp. Pl. ed. 2 (1763) 720; DC. Prodr. i. 247; Roxb. Fl. Ind. ii. 567. *C. horrida*, Linn. f. Suppl. 264; Wight & Arn. Prodr. i. 26; Wight l.c. t. 173.

VIOLACEAE.—*Ionidium suffruticosum*, Ging. Two forms of this variable plant occur in the Hermann Herbarium, the bushy pubescent one was called by Linnaeus *Viola suffruticosa*, the laxer and more glabrous specimens *V. enneasperma*.

POLYGALACEAE.—*Polygala bolbothrix*, Dunn sp. nov.—*P. cilata*, Wight & Arn. Prodr. i. 38 (not of Linn.).

This species, which is widely distributed in S.W. India, was recognised and fully described by Wight & Arnott (l.c.) but the binominal employed was not really available, having been applied by Linnaeus to a *Salomonina*. The specimen in Linnaeus's herbarium leaves no possible doubt on this point, and it has therefore become necessary to rename Wight & Arnott's species.

Polygala chinensis, L. There can be no doubt that the numerous forms usually collected under this name are rightly associated with the specimens so named in Linnaeus's herbarium. But the two erect simple plants which constitute his type have an abnormal appearance, owing apparently to the effect of some gall. The absence of a bearded crest, as described by Linnaeus, is probably due to the same cause.

CARYOPHYLACEAE.—*Polycarpaea aurea*, Wight & Arn. in Ann. Nat. Hist. ser. 1, iii. 91.—*P. corymbosa*, Lam. var. *aurea*, Wight III. ii. 44 t. 110; F.B.I. i. 245; Cooke, Fl. Bombay, i. 66.

The distinct appearance of this species has led authors to make strenuous efforts to find characters definite enough to separate it practically from the innumerable other forms of this variable group. There is an old note on one of the Kew herbarium sheets representing it, and probably from Sir Joseph Hooker to J. Gay, "Can you not find characters to separate this beautiful plant from *P. spadicea* or *P. corymbosa*?" Such characters were evidently not discovered then and the form was relegated to a varietal status in the Flora of British India. From his knowledge of the plant in a wild state and his study of available dried specimens Mr. Gamble, however, advises me that the characters enumerated in the Key of this genus in the Flora of Madras are sufficient to distinguish it in the field as a well-marked species.

ELATINACEAE.—*Bergia capensis*, Linn. Following the Index Kewensis and Cooke's Flora of Bombay (i. 74) the above name which was altered by Willdenow to *B. verticillata* on the ground that the adjective *capensis* was inappropriate to a plant not native at the Cape is now, in accordance with the International rules of botanical nomenclature, restored.

HYPERICACEAE.—*Hypericum Wightianum*, Wall. An examination of the good series of specimens now before me indicates that the above species should not be referred to *H. napaulense*, Choisy, being intermediate between that species and *H. elodeoides*, Choisy. Both of Choisy's species are founded on Wallich's specimens so that all three types were able to be laid side by side at Kew where the Wallichian herbarium is now preserved. *H. Wightianum*, Wall. may be readily distinguished from *H. elodeoides*, Choisy in its lowest leaf veins not reaching beyond the middle of the blade instead of extending nearly to the tip, and from *H. napaulense*, Choisy by its larger sepals which are about equal to the whole pistil when in flower and to the capsule in fruit instead of being equal to the ovary when in flower and to half the capsule when in fruit.

GUTTIFERAE.—*Garcinia tinctoria*, Dunn. *Xanthochymus tinctorius*, DC. is the oldest available name for the species; Roxburgh's *X. pictorius* is older but the trivial name is preoccupied in *Garcinia* by *G. pictoria*, Roxb. which is a different species.

Garcinia spicata, Hook. f. The specific name *ovalifolia* (*Xanthochymus ovalifolius*, Roxb. 1832) has priority over *spicata* (*X. spicatus*, Wight & Arn. 1834) but it was first used in combination with *Garcinia* by Oliver in the Flora of Tropical Africa to designate a different species and is therefore not available for this one.

Calophyllum decipiens, Wight. This appears to be the earliest name which can be applied accurately to this *Calophyllum* and the fact that Thwaites afterwards applied it to another species, i.e., to the tree subsequently called *C. Thwaitesii* (Planch. et Trian. Mem. Guttif. 232) does not invalidate its use for the one originally intended by Wight.

C. tomentosum, Wight. The type of this species is a Ceylon tree which has not been reported in the area covered by this Flora. The Travancore species is much less tomentose and should bear Beddome's name of *C. elatum* (Bedd. Fl. Sylv. t. 2).

DIPTEROCARPACEAE.—*Hopea Wightiana*, Wall. and *H. glabra*, Wight & Arn. published by the latter at the same time (Prodr. i. 85) appear both to belong to the same tree. Beddome placed them together but Dyer and Brandis separated them. Wight's figure (Ill. t. 37) showing a different leaf-nervation should probably not be cited here.

Balanocarpus utilis, Bedd. The pubescent petals of this species serve to distinguish it in the absence of fruit from the glabrous-petalled but otherwise closely similar *Hopea parviflora*, Bedd.

MALVACEAE.—*Malva parviflora*, Linn. The synonymy as regards S. Indian specimens has become much confused. Wight and Arnott (Prodr. 45) mention two varieties of *M. rotundifolia*; var. *a*, having petals many times longer than the calyx, is probably *M. sylvestris* and the citation of Heyne's Mysore plant doubtless refers to the specimens of that species now preserved

in the Kew Herbarium, collected there by him on April 16th, 1800; var. β founded on Wallich n. 1884 f. is *M. parviflora*, Linn., having glabrous petal-claws and interlocking carpel-teeth. As Wight and Arnott appear not to have appreciated the differences between these species the descriptions in the Prodrômus should not be cited.

Sida veronicaefolia, Lam. The spelling *veronicifolia* is not that of Lamarck which is as above and although the Vienna Rules recommend the use of "i" in such cases the recommendation is only for future use and does not enjoin retrospective correction.

Sida Schimperiana, Hochst. *Melochia truncata*, Willd., both as described by Willdenow and as exemplified by a plant in the Kew Herbarium determined by him, is clearly referable to this species and if the binominal *Sida truncata* were not already preoccupied by a Brazilian plant this species would be correctly designated by that name. It has no claim to identification with the entirely different plant *Melochia corchorifolia*, Willd.

Abutilon polyandrum, Wight & Arn. Cooke points out (Fl. Bomb. i. 95) that the *A. polyandrum* of G. Don is a misprint for *A. polyanthum*, quite a different species originally named, by Schlechtendal, *Sida polyantha*. Wight and Arnott should therefore be cited as the authors of the first-mentioned binominal and not G. Don who published it earlier but by accident.

A. hirtum, G. Don founded upon Lamarck's *Sida hirta* (1785) has precedence of *A. graveolens*, Wight & Arn. founded upon Roxburgh's *Sida graveolens* (1805).

Abutilon glaucum Cav. Cavanilles's *Sida glauca*, upon which this is founded, has priority over *Sida mutica*, Delile, the prototype of G. Don's *Abutilon muticum*.

Decaschistia crotonifolia, Wight & Arn. Prodr. (1834) 52 is the first publication of this binominal and the reference to Wight's specimen No. 215 identifies it with the shrub with short white tomentum on the branches as distinct from Craib's *D. rufa* (Kew Bull. 1912, 35) which has rough reddish spreading hairs. It is important that the first named should not be confused with Wallich's *Hibiscus crotonifolius* (Wall. Herb. 1901 A) which is referable to Craib's species.

Hibiscus moschatus, Wight & Arn. being founded on Wight no. 203 (*H. Abelmoschus*, Linn.) and Wallich no. 2699 (*H. esculentus*, Linn.) must be omitted from synonymy as a mixture of two species.

Bombax scopulorum, Dunn. This tree is fully described in Bourdillon's Forest Trees of Travancore (p. 45) where it is doubtfully identified with Wallich's *B. insigne* and attributed to Malabar, Burmah, and the Andamans in addition to Travancore. Perhaps the distinctions between it and Prain's var. *Wightii* of *B. insigne*, Wall. were not observed by Bourdillon who confused it in consequence with that more widely distributed tree.

XII.—GARDEN NOTES ON NEW TREES AND SHRUBS.

W. J. BEAN.

(With Plate.)

XIX.—*New Chinese and Japanese species.*

Celastrus flagellaris, Ruprecht. Celastraceae.

Although described by Ruprecht as long ago as 1857, this climber is a comparatively new plant in cultivation. It was obtained for Kew from a French nursery a few years ago and last year bore fruit freely. It is a deciduous climbing shrub found wild in Manchuria, Corea, Japan and N. China. The stems are slender, armed at each node with a pair of hooked spines about $\frac{1}{6}$ in. long, and are described as growing 25 ft. high. Leaves roundish to broadly oval, $\frac{3}{4}$ to $2\frac{1}{4}$ in. long, acute at the apex and cuneate at the base, bright green on both sides, finely toothed. Among cultivated species of *Celastrus* this is very distinct in the great proportionate length of the petiole which is as much as $1\frac{1}{4}$ in. long. The fruit is a three-sometimes four-celled capsule, globose when unripe, about $\frac{1}{4}$ in. in diameter, and terminated by the persistent style $\frac{1}{8}$ in. long. It is when it bursts that the shrub is most ornamental, the inner face of it is then shining yellow, whilst the aril, or coat of the seeds is scarlet.

The species is perfectly hardy and of vigorous habit.

Celastrus hypoleucus, Warburg. (*C. hypoglaucus*, Hemsley.) Celastraceae.

Originally introduced by Wilson for Messrs. Veitch during one of his early journeys in China and again in greater quantity during the later ones, this *Celastrus* is now probably fairly distributed over the country. According to the collector it is common in the mountains of north-west Hupeh, and he describes it as strikingly beautiful when laden with fruit in autumn. It is a vigorous deciduous climber with purplish, glabrous young shoots. The leaves are oblong, oval or obovate, 4 to 6 in. long, and 2 to 3 in. wide on our young plants; they are glabrous and dark green above, and usually very glaucous beneath. The flowers are in terminal racemes sometimes 8 in. long, small and yellowish-green. The fruits are globose and about the size of a large pea until they burst, when they show the yellow and orange of the inner surface of the capsule valves and the coat of the seed.

The species is apparently quite hardy and vigorous, although we have as yet no record of its having borne fruit in this country. It is distinct amongst the cultivated species of *Celastrus* in the combination of a long terminal inflorescence with glaucous leaves.

***Cercis racemosa*, Oliver. Leguminosae.**

Discovered by Prof. A. Henry about 1886 and described and named by Prof. Oliver in *Hooker's Icon. Plant.* xix. t. 1894, this very distinct species of Judas tree was not introduced until some twenty years later, when Mr. Wilson sent home seeds collected by him in Western Hupeh. It is a deciduous shrub or small tree occasionally 30 ft. high, its young shoots thickly set with lenticels and more or less pubescent. The leaves have the characteristic *Cercis* form, being cordate, $2\frac{1}{2}$ to 5 in. long, three-fourths as wide; but from those of all other cultivated species, they differ in being pubescent beneath, especially on and near the chief veins. The most distinctive character of the species, however, is found in the racemose arrangement of the flowers, all the others having them in fascicles. The racemes are pendulous, $2\frac{1}{2}$ to 4 in. long, the rachis and pedicels very pubescent. Wilson describes the flowers as "silvery rose." We have not yet seen them in gardens, but judging by dried specimens the tree flowers very profusely and is, indeed, one of the most beautiful of Chinese trees. Seedling trees are in Mr. Vicary Gibbs' collection at Aldenham, and in that of Miss Willmott at Warley, and we have grafted ones at Kew. The other Chinese species, *C. chinensis*, Bunge, has been in cultivation for many years, but we have found it too tender to be a success. Wilson observes that it is always growing at lower altitudes than *C. racemosa*, which we have every reason to believe will prove quite hardy.

***Disanthus cercidifolia*, Maximowicz. Hamamelidaceae.**

For several years past no tree or shrub at Kew has made a richer display with its autumnal colour of foliage than this. It is a deciduous shrub described as growing 8 to 10 ft. high with slender spreading branches, which, like the foliage, is perfectly glabrous. The leaves are very like those of the common Judas tree in shape, being broadly ovate to roundish, often cordate at the base, 2 to $4\frac{1}{2}$ in. long, almost as wide, three- or five-nerved. In summer they are deep green, but for a week or two before falling in autumn turn a beautiful claret colour suffused with orange. The plant was first introduced about twenty years ago, but is still very rare and does not appear to have flowered under cultivation in this country. It does not, however, seem to have much beauty of blossom. Two stalkless flowers, set back to back, are borne on axillary peduncles $\frac{1}{4}$ in. long. The petals are narrow, tapering; $\frac{1}{4}$ in. long, dark purple; calyx-lobes short and recurved, $\frac{1}{8}$ in. long; stamens five. Fruit a woody capsule containing several shining, dark brown compressed seeds, $\frac{1}{8}$ in. long.

This shrub is a native of Japan where it flowers in October. At Kew we have found it rather tender when young, but a plant now 6 ft. high growing in association with, and sheltered by, tall heaths has not suffered from cold since it was obtained ten years ago.

***Magnolia officinalis*, Rehder & Wilson. Magnoliaceae.**

This *Magnolia*, at first considered to be the Chinese form of

M. hypoleuca, has lately (*Plantae Wilsonianae* i. p. 391) been made a species by Messrs. Rehder and Wilson. It was originally introduced by the latter to the Coombe Wood Nursery about the end of 1900. From Messrs. Veitch two plants were obtained for the Kew collection which are succeeding very well. Probably it is in other collections under the name of *M. hypoleuca*. The Veitchian "Wilson" number is 371.

M. officinalis is a deciduous tree 30 to 50 ft. high, its young shoots silky tomentose the first year, becoming glabrous the second and turning ultimately a yellowish grey colour. The leaves are of magnificent proportions, being sometimes as much as $1\frac{3}{4}$ ft. long and 9 in. wide. In outline they are obovate, the apex rounded, the base cuneate. The upper surface is glabrous, the lower one pubescent, glaucous, and minutely reticulate. The flower is solitary at the end of a leafy shoot, white, fragrant, 6 to 8 in. in diameter. Sepals and petals together are nine to twelve in number, fleshy. Stamens very numerous, their filaments red, making a beautiful and conspicuous centre to the flower. Fruits about 4 in. high, half as wide, slightly ovoid, flat at the top.

According to Wilson this Magnolia is cultivated in Western Hupeh and Szechuan, but, although he has no doubt it is a genuine native of those regions, he did not find it growing wild. So far as can be judged at present, the most perceptible distinction between our young trees and those of *M. hypoleuca* is in the colour of the young wood which, in the latter species, is purple. *M. hypoleuca* is also the bigger tree.

Meliosma Beaniana, Rehder & Wilson. Sabiaceae.

Previous to Wilson's journeys in Central and Western China, the genus *Meliosma* was represented in gardens by a single rather tender species, *M. myriantha*, Sieb. & Zucc., introduced from Japan by Maries about 1879. Four other species at least, all apparently quite hardy, are now in cultivation, thanks to Mr. Wilson's efforts. The genus *Meliosma* has two well-marked groups, those with simple leaves like *M. myriantha* and *M. cuneifolia*, and those with pinnate leaves. To the latter group *M. Beaniana* belongs.

It is a deciduous tree found by Wilson to range between 40 and 80 ft. in height. The leaves are composed of usually four and a half pairs of leaflets (sometimes six and a half pairs), which are oval or obovate, the lower ones the smallest and 1 to 2 in. long, the others increasing in size towards the end, where they are $2\frac{1}{2}$ to 5 in. long and 1 to $2\frac{1}{2}$ in. wide, smooth or nearly so above, with tufts of reddish brown tomentum in the vein-axils beneath. The flowers, for which we may have some years to wait, are creamy white and borne below, but with, the young leaves in spring. They are in panicles up to 8 in. long, and, as in all *Meliosmas* are small and about $\frac{1}{3}$ in. wide. Fruit black, globose, $\frac{1}{4}$ in. in diameter.

Mr. Wilson speaks highly of the beauty of this tree as seen by him wild in Hupeh and Szechuan. When in flower during

the month of May, the pendulous or spreading panicles are so clustered and so numerous on the tree that it is covered with blossom. It then makes a strikingly conspicuous object in the landscape and one of the handsomest of Chinese trees. The Kew plants were raised from seed gathered in 1907 and 1910. They are growing promisingly. The "Wilson" numbers of this tree are 154, 258, and 258A.

Prinsepia uniflora, Batalin. Rosaceae.

The genus *Prinsepia* has been known for some years past in shrub collections by *P. sinensis*, more commonly known as *Plagiospermum sinense*, Oliv. (see *Kew Bulletin*, 1909, p. 354). This year, until spoilt by the snow and frosts of early March, *P. sinensis* was flowering at Kew very prettily. Sir F. W. Moore also sent sprays thickly furnished with blossom from Glasnevin. A plant of *P. uniflora* has just been received from the Arnold Arboretum, where the species was raised in 1911 from seed collected by Purdom in Shensi, and where it has flowered and developed fruits. It is a deciduous shrub, its branches armed with slender, straight thorns $\frac{1}{4}$ to $\frac{1}{2}$ in. long. The leaves are dark glossy green, 1 to $2\frac{1}{4}$ in. long, $\frac{1}{4}$ to $\frac{1}{3}$ in. wide, the margins of the lower part very sparsely serrate. As in *P. sinensis* the flowers come from the axils of the clustered leaves on the year-old shoots, but they are very distinct from the bright yellow ones of that species in being white. Each flower is $\frac{3}{8}$ in. wide, borne on a glabrous peduncle $\frac{1}{6}$ in. long, the petals obovate, the calyx roundish, ciliate.

Closely allied to *P. sinensis*, this is distinguished, not only by the white flowers, but also by the shorter peduncles and narrower leaves distantly toothed towards the base.

Prunus Conradinae, Koehne. Rosaceae.

Among the numerous species of *Prunus* introduced from China by Wilson, this has been the first to establish its value as a flowering tree. During the last week of January, 1916, and the first week of February it was the most attractive tree or shrub in flower out-of-doors at Kew. And we heard from Mr. J. C. Williams that at Caerhays it was also very beautiful about the same time. It belongs to the *Cerasus* or cherry group of *Prunus* and is a deciduous tree reaching 35 to 40 ft. high in a wild state. As represented by small trees at Kew its branches are semi-pendulous and very graceful (see Plate III. facing p. 70). The oblong or obovate leaves are $2\frac{1}{2}$ to 6 in. long, serrate, narrowed abruptly at the apex to a short, acuminate point. The flowers are white, produced three to five together in very shortly-stalked umbels. Each flower is about $\frac{3}{4}$ in. in diameter, the narrowly oblong petals being deeply notched or jagged at the apex. Many of the stamens assume a petaloid character. The flowers are charmingly fragrant.



1. Flower showing bilobed petals and petaloid stamens; 2. details; 3. petal with claw; 4-8. various petaloid stamens; 9. stamen.

P. Conradinae was raised from seed sent from the Arnold Arboretum late in 1907. It had been collected by Wilson the previous June in Western Hupeh at 3500 to 4000 ft. elevation. Of very early flowering trees, this promises to be the best of recent introduction.

***Pterocarya hupehensis*, Skan. Juglandaceae.**

An addition to a group of trees of such distinction as the Wing-nuts is welcome. A few fine trees of *P. caucasica* are scattered over the country, but considering its adaptability for dampish places it has not been planted so generally as one might expect.

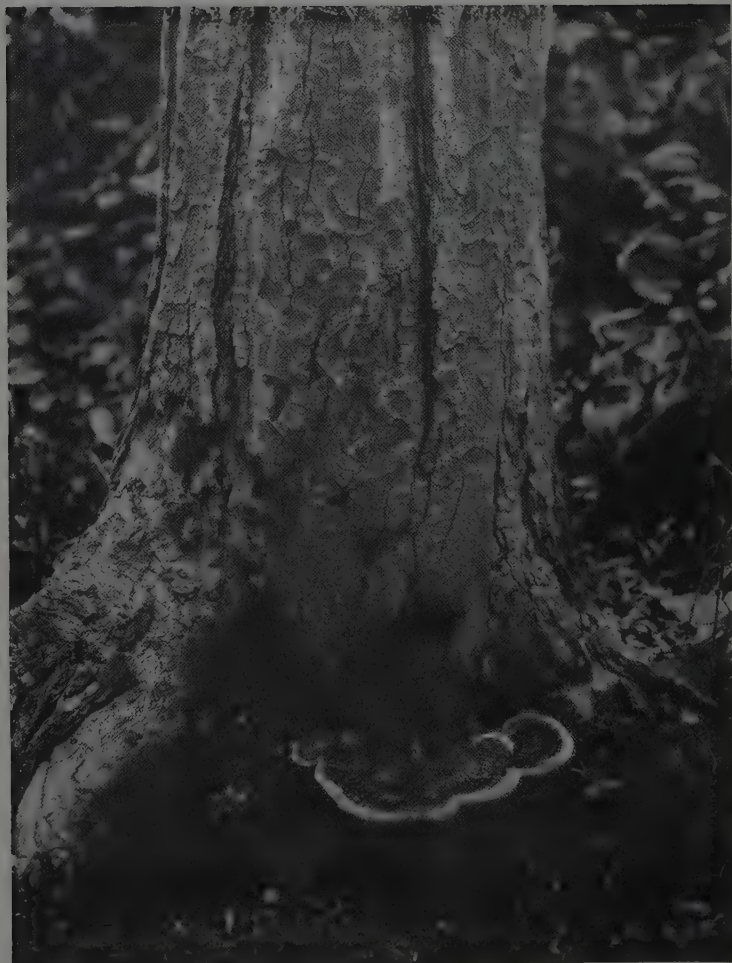
P. hupehensis, introduced from the province of Hupeh, China, to the Coombe Wood nursery by Wilson during one of his early journeys, is similar in many respects to the Caucasian tree. It is deciduous and grows upwards of 70 ft. in height. The young shoots are glabrous. On the type specimens collected by Henry (No. 6158) now preserved in the Kew Herbarium, and the only one there, the leaflets number five to nine on each leaf, but on a young tree growing at Kew there are sometimes as many as twenty-three. Each leaflet is oval-lanceolate, obliquely rounded at the base, acuminate, finely serrate, and the largest are 4 to

PLATE III.



PRUNUS CONRADINAE.

PLATE IV.



POLYPORUS SHOREAE.

5 in. long by $1\frac{1}{4}$ to 2 in. wide. There are tufts of brown pubescence in the vein axils beneath, but these are not so conspicuous as in *P. caucasica*. The fruits, borne on pendulous spikes up to 20 in. long, consist of a small nut supporting a wing on each side, the wing roundish and $\frac{1}{2}$ in. long.

The species appears to be very hardy, and planted on the damp situation south of the Lily house (No. XV.), is thriving well.

***Stewartia sinensis*, Rehder & Wilson.** Ternstroemiaceae.

Mr. E. H. Wilson introduced this shrub or small tree to the Coombe Wood nursery during one of his earlier Chinese journeys. Being at first regarded as a form of the Japanese *S. monadelphæ*, Sieb. & Zucc., it was distributed by Messrs. Veitch under that name, and as *S. monadelphæ* no doubt exists in several gardens. A study of full material has led Messrs. Rehder and Wilson to treat it as a new species.

It is described as being occasionally 30 ft. high. Our young plants have the shoots at first thickly covered with fine, out-standing hairs. Leaves deciduous, narrowly oval, tapered at both ends, remotely serrate, furnished above with numerous silky hairs at first and with similar hairs beneath but chiefly on the midrib; they are $2\frac{1}{2}$ to 4 in. long, 1 to $1\frac{1}{2}$ in wide, the petiole hairy, $\frac{1}{8}$ in. long. Judging by the author's description, some forms are glabrous or nearly so. Flowers white, solitary in the leaf-axils, about $1\frac{1}{2}$ wide, the petals silky on the outside. Stamens numerous, with downy filaments. Styles united into one column, five-rayed at the top.

This shrub appears to be quite hardy at Kew and thrives well in a peaty soil such as suits heaths. It is quite easily propagated by cuttings. From the true *S. monadelphæ*, perhaps not in cultivation, it is distinguished by its larger, more distinctly five-angled capsules which are twice as wide as those of *S. monadelphæ*.

XIII.—FUNGI EXOTICI : XX.

(With Plate.)

***Polyporus pyrophilus*, Wakefield.**

Pileus 6-8.5 cm. diametro, crassus, rugulosus, azonatus, minute velutinus, rhabarbarinus vel pallide cinnamomeus. *Contextus* rhabarbarinus. *Stipes* crassus, 3-6.5 cm. longus, nunc cylindricus, basi subbulbosus, 1.5 cm. diametro, nunc deorsum incrassatus, 3-4 cm. diametro, plus minusve rugulosus, velutinus, pileo concolor. *Pori* minuti, concolores, vix decurrentes. *Sporae* ellipticae, fere hyalinae, $5-6 \times 3 \mu$.

TROPICAL AFRICA. Nigeria: Southern Provinces; on burnt ground, Farquharson 50, May, 1914. Sierra Leone: amongst ashes, N. W. Thomas, 1914.

A large robust species. The Nigerian specimens have very thick stems and resemble in habit *P. orientalis*, Lloyd, but differ in the absence of setae in the hymenium. The Sierra Leone specimens are more slender and regular in form, but the

species appears to be characterised by the large size, short thick stem, and almost hyaline spores.

Polyporus Shoreae, Wakefield.

Pileus horizontalis, applanatus, sessilis vel substipitatus, 18-27 cm. latus \times 15 cm. longus \times 1-2 cm. crassus (in sicco), siccitate recurvus, margine pallidiore obtuso. *Cutis* tenuis, fusco-badia vel nigrescens, primo rubiginoso-pruinata, vix zonata, demum glabra, rigida, rimosa. *Contextus* ad 1.5 cm. crassus, fibrosus, induratus, subzonatus, ferrugineo-fulvus. *Tubuli* ad 3 mm. longi, intus glaucescentes, rigidi. *Pori* minuti, subangulati, dissepimentis tenuibus rigidissimis, primo glaucescentes, demum ferrugineo-umbrini. *Setae* nullae. *Sporae* hyalinae, subglobosae, $3-3.5 \times 2.5-3 \mu$.

INDIA. Bengal: Angul Division, McCrie, 1910; Buxa Division, Hole, 1915; Shaw, 1915; Jalpaiguri Division, Hole, 1915; on trunks of *Shorea robusta*, near the ground.

The plate (facing p. 71), shows a mature sporophore at the base of the trunk of a large tree of *Shorea robusta*.

The fungus is suspected of being the cause of a serious disease of Sal. The wood beneath the seat of the sporophores invariably shows the condition known as "partridge wood," the effect being similar to that of *Trametes Pini*, but more marked.

The species appears to be quite distinct from any previously described. When dry it is readily recognised by the hard but very brittle texture, especially of the pores, and the wrinkled and deeply cracked, dark crust. Photographs of living specimens show the margin of the pileus to be pale (whitish?), soft and swollen when fresh, but in dried material it is much shrunken and discoloured. It would also appear to exude drops of water, like that of *Polyporus dryadeus*. The flesh resembles in texture that of *P. dryadeus*, but in colour is more yellow, between Ridgway's "Antique brown" and "Ochraceous tawny."

Polystictus violaceus, Wakefield.

Pilei imbricati, sessiles, 5-6 cm. lati, 5 cm. longi, subinde ad 14 cm. lateraliter confluentes, tenues, in sicco rigidi, azonati, leniter rugulosi, minute velutini, violaceo-cervini. *Contextus* violaceus tenuis; tubuli concolores, 2 mm. longi, rigidi. *Pori* minuti, irregulares, angulati dissepimentis tenuibus, violascentes, marginem versus pallide cervini. *Sporae* non visae. *Hyphae* pallide lilacino-fulvae, $3.5-4 \mu$ diametro.

TROPICAL AFRICA. Uganda: Namutamba Forest; on a decayed stump, Jan. 1915, Maitland 103.

In coloration this species closely resembles *Trametes violacea*, Lloyd, but cannot be regarded as a form. It differs entirely in habit; moreover, the hyphae of the pore walls in this species are pale, similar to those of the flesh, whereas in *T. violacea* they are dark purplish brown.

The colour of the pileus exactly matches Ridgway's "Fawn," with here and there a warm violet tinge.

Caldesiella Duemmeri, Wakefield.

Fungus late effusus, tenuissimus, tomentosus, fusco-ferruginosus, margina indeterminato concolore. *Aculei* minuti, nudo oculo vix conspicui, conici, acuti, vel subgranuliformes, haud conferti. *Cystidia* nulla. *Sporae* copiosae, ferruginosae, punctato-scabrosae, globosae, $4\ \mu$ diametro. *Hyphae* laxae intertextae, septato-nodosae, $2.5 \times 3\ \mu$ (basales ad $5\ \mu$) diametro.

TROPICAL AFRICA. Uganda: Kipayo; on a rotten log in forest, May, 1914, Dümmer 635.

Distinguished from known species of *Caldesiella* by the very small spores. The general colour of the hymenium matches Ridgway's "Raw Umber" (17 m).

Hymenochaete tristicula (Berk. & Br.) Mass. in Journ. Linn. Soc. xxvii. 1890, p. 111.

Corticium tristiculum, Berk. et Br. in Journ. Linn. Soc. xiv. 1873, p. 71.

H. castanea, Wakefield in Kew Bull. 1914, p. 260.

Duportella velutina, Pat. in Phil. Journ. Sci. x. 1915, p. 87 (?).

The receipt from Uganda of material of this species in an older stage has led to the establishment of the above synonymy. The Nigerian collection No. 5, on palm leaves, on which *H. castanea* was founded, is in a young state, and more brightly coloured than usual. Unless it be subsequently found that there is a spore-difference, however, it is not possible to maintain it as a distinct species. In the older material, the mature basidia project above the brown setae, forming a compact, waxy hymenium, which is cracked into small areas when dry. In this stage the hymenium is greyish or even pallid, and the chestnut colour given by the setae is visible only in the marginal parts of the fungus. Abundant spores are present in these old specimens. They are hyaline, cylindric-ellipsoid, slightly curved, $8-11 \times 3-4\ \mu$.

The genus *Duportella* was recently established for fungi having the peculiar structure of this species. From the description it seems probable that *D. velutina* is identical with the present plant. *D. Raimundoi* is said to be more brightly coloured, but as spores were not found it is possible that this is again a question of age, as in the case of *H. castanea*. *Duportella* is related to *Hymenochaete* in the same way of *Gloeocystidium* to *Corticium*. In neither case does the presence of "gloeocystidia" appear to be sufficient to warrant a generic distinction. The present plant is peculiar in the eventual development of the hymenium above the setae, but it seems preferable on the whole to retain it in *Hymenochaete*.

Geaster pulverulentum, Wakefield.

Exoperidium fere ad basim in segmenta 6-7 partitum, 4-5.5 cm. diametro; segmenta patentia vel revoluta, strato externo albedo, floccoso, mox secedente, e rhizomorphis albidis oriundo, strato interno carnosio, griseo, siccitate rimoso. *Endoperidium* subglobosum, substipitatum, umbrinum, griseo-pruinatum. *Peristomium* vix prominens, obscurius, sericeo-

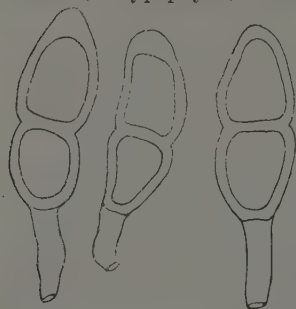
striatum, non sulcatum. *Hyphae* capillitii olivaceo-brunneae, crasse tunicatae, ad $6\ \mu$ latae, laeves vel granulis minutis incrassatae. *Sporae* fusco-brunneae, laeves, $3-3.5\ \mu$ diametro.

TROPICAL AFRICA. Nigeria: Southern Provinces; on the ground, July, 1914, *Farquharson* 58.

The species differs from *G. saccatus* in the slightly stalked endoperidium and spreading, not saccate, exoperidium; from *G. minimus* in the larger size; and from *G. Schmidelii* in the absence of the sulcate mouth.

Puccinia Pentadis-carneae, Wakefield.

Sori teleutosporiferi punctiformes, pulvinati, cinnamomeo-brunnei, hypophylli, maculis minutis brunneis insidentes.



Teleutospores ($\times 825$).

Teleutosporae laeves, oblongae, sursum leniter attenuatae vel rotundatae, apice non vel ad $6\ \mu$ incrassato, medio valde constrictae, flavidae, $30-40 \times 13-15\ \mu$; pedicelli hyalini, $4-7\ \mu$ crassi, ad $25\ \mu$ longi.

TROPICAL AFRICA. Uganda: Kipayo; grassland, on leaves of *Pentas carnea*, Oct., 1914, *Dümmer* 1123.

Distinct from *P. Pentadis*, P. Henn. in the smooth teleutospores. These germinate in situ.

Camillea africana, Wakefield.

Stroma erumpens, substipitatum; capitulum ad 4 mm. diametro, primo furfuraceum, purpureo-fuscum, demum laeve, subnitens, carbonaceum, fragillimum. *Perithecia* erecta, oblonga, immersa, collis destitutis, ostiolis non prominulis, inconspicuis. *Asci* mox diffuentes. *Sporae* fuscae, inaequilaterales, curvulae, ellipticae vel cylindraceae, $9-10 \times 4-5$ (-6) μ .

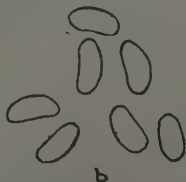
TROPICAL AFRICA. Uganda: Mount Elgon; on dead wood, Small 137.

The species somewhat resembles in habit *C. surinamensis*, B. & C., but is larger, and has smaller spores.



a

a. Habit (nat. size).



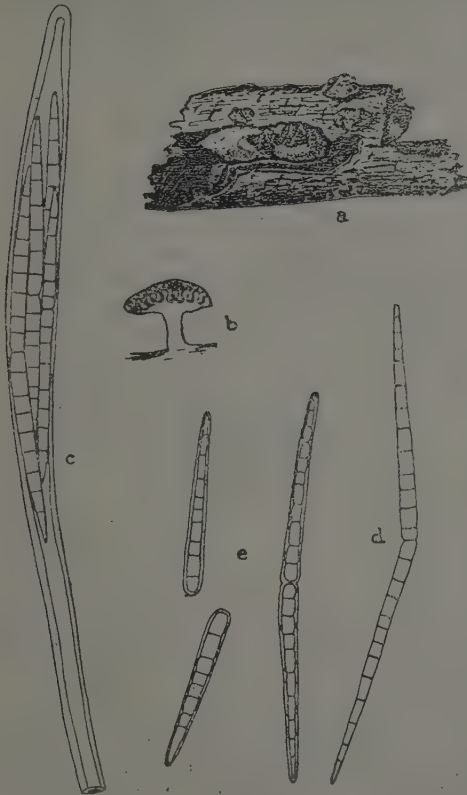
b

b. Spores ($\times 825$).

Cordyceps peltata, Wakefield.

Stroma stipitatum, stipite ligno omnino immerso, capitulo supra corticem emergente. *Capitulum* peltatum, pulvinatum,

primo pallidum deinde rufo-brunneum, margine pallidiore, 1-2 processibus sterilibus conicis ad 1 mm. longis praeditum, ostioliis



a. Habit of fungus (nat. size). b. A single head ($\times 4$). c. Ascus ($\times 825$). d. Spore as seen in water ($\times 825$). e. Spores stained with iodine to show outer wall ($\times 825$).

obscurioribus vix vel leniter prominulis punctatum, 2-5 mm. vel e fusione 5-7 \times 3-4 mm. *Stipes* brevis, pallidus, e mycelio larvam obtegente et destruende oriundus. *Perithecia* immersa, circa 0.25 mm. longa. *Asci* clavati, longe stipitati, pars sporifera 100 \times 10 μ . *Sporae* hyalinae, fusiformes, utrinque acutae, multiseptatae, 72-91 \times 3-3.5 μ , saepe medio geniculatae, maturitate in duobus articulis secedentes.

WEST INDIES. St. Vincent; parasitic on larvae of *Cryptorhynchus* sp., infesting cultivated *Codiæum*, W. N. Sands. Sent by the Mycologist under the number V. 25-6-15.

The species is very distinct from other known species of *Cordyceps* not only in the peculiar habit but also in the large

spores which instead of breaking apart at every septum at maturity separate only across the middle into two narrowly wedge-shaped halves. Each spore is surrounded by a very delicate hyaline outer wall, which can be only faintly distinguished even when treated with iodine. The peltate heads on the surface of the bark have superficially the appearance of a species of *Hypocrea*, but when the bark is dissected away the stalks are seen arising from a felt-like, whitish mycelium which completely envelopes the dead larvae lying in their burrows. Several stromata may arise from one larva, and the heads occasionally become confluent.

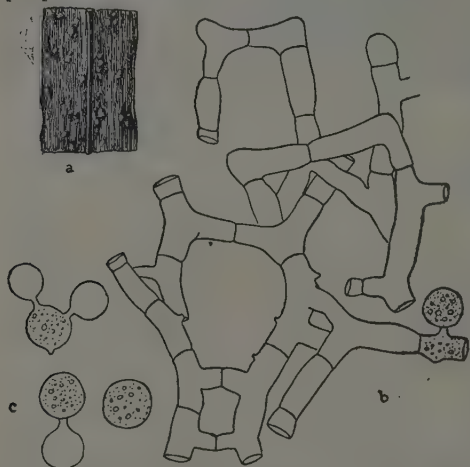
Beniuowskia Penniseti, Wakefield.

Maculae minutae, pallidae, vix distinctae. *Sporodochia* hypophylla, erumpentia, laxa, mollissima, sparsa vel gregaria, albida

vel pallidissima rosea, 0.5–1 mm. diametro. *Hyphae* 4–5 μ diametro, hyalinae, septatae, reticulato-anastomosantes, maculis polygonalibus 30–85 μ diametro. *Conidia* lateralialia, edenticulis oriunda, globosa, laevia, hyalina, 10 μ diametro.

TROPICAL AFRICA. Uganda: Kampala; leaves of *Pennisetum purpureum*, Schum., *Small* 251. Said to occur also on *Sorghum*

vulgare.



a. Habit (nat. size). b. Portion of tuft showing anastomosing conidia-bearing hyphae ($\times 825$). c. Conidia ($\times 825$). Two show budding.

The conidia-bearing hyphae arise from a dense mass of mycelium within the tissues of the leaf, and are at first simple, erect, and closely packed together. On reaching the surface of the leaf they become branched and united into a network, forming small cottony tufts. The conidia are borne on small tooth-like projections occurring irregularly along the length of the hyphae. Occasionally free conidia are seen united in pairs, or more rarely three in a group, suggesting that the formation of secondary conidia by budding has taken place.

E. M. WAKEFIELD.

***Puccinia pulvinata*, Massee in *Kew Bull.* 1911, p. 224.**

This name being antedated by *P. pulvinata*, Rabenh. in *Hedwigia*, 1871, p. 20 (Sydow, *Monogr. Ured. i.*, p. 76), it is necessary to change it. It occurs on the same leaves of *Osyridocarpus natalensis*, DC. as *Aecidium Osyridocarpi*, Mass. and, although there is no evidence that the two are connected, there can be no objection to naming it *P. Osyridocarpi*, Grove; in that case, if a connection is demonstrated later, unnecessary multiplication of names will be avoided.

In the same sori as the teleutospores and intermingled with them are comparatively few uredospores, oval, pallid honey-colour, slightly paler than the teleutospores, rather thick-walled, about $28 \times 25 \mu$, densely and minutely warted. There is an

error in the original description in the measurements given for the teleutospores; instead of measuring $50 \times 35 \mu$, the size varies from $25\text{--}38 \mu \times 19\text{--}23 \mu$. The sori present a very close resemblance in shape and colour to those of *Puccinia Malvacearum*, Mont.

W. B. GROVE.

XIV.—NEW ORCHIDS : DECADE 44.

431. *Pleurothallis papillifera*, Rolfe; a *P. pachyglossa*, Lindl., petalis labello aequilongis, extus et margine papillis purpureis instructis differt.

Herba epiphytica. *Caules* aggregati, graciles, 3–5 cm. longi, vaginis tubulosis obtecti. *Folia* oblonga vel elliptico-oblonga, minutissime tridenticulata, coriacea, 4–7 cm. longa, 1.3–1.9 cm. lata. *Scapi* graciles, erecti, 12–15 cm. longi, vaginis paucis obtecti; racemi flexuosi, multiflori. *Bracteae* tubulosae, apice dilatatae, obtusae, 3–4 mm. longae. *Pedicelli* graciles, arcuati, circiter 1 cm. longi. *Flores* mediocres. *Sepalum* posticum lanceolatum, acutum, profunde concavum, 1.2 cm. longum; sepala lateralalia connata, oblongo-lanceolata, obtusa, profunde concava, 1.1 cm. longa. *Petala* oblonga vel subspathulata, obcordata vel truncata, intus subconcava, extus et margine papillis numerosis instructa. *Labellum* pandurato-oblongum, acutum, carnosum, scabridum, subconcavum, 6 mm. longum; lobi laterales rotundati, erecti, submembranacei. *Columna* clavata, 2 mm. longa.

COSTA RICA. *C. H. Lankester*.

Sent to Kew by Mr. C. H. Lankester, and flowered in the collection in November, 1915. The sepals are light green. and the petals semi-transparent white, with numerous dark purple papillae on the nerves and margin outside.

432. *Kraenzlinella rufescens*, Rolfe; affinis *K. Tunguraguae*, O. Kuntze, sed planta multo minore facile distinguenda.

Folia breviter petiolata, oblonga, subobtusata, coriacea, circiter 8 cm. longa, 2 cm. lata; petiolus 1 cm. longus. *Scapi* erecti, 15–18 cm. longi, subteretes, vaginis tubulosis paucis apice conduplicatis obtecti; racemi multiflori. *Bracteae* conduplicatae, lanceolatae, acuminatae, carinatae, 1.2–1.3 cm. longae. *Pedicelli* 5–6 cm. longi, ovarium muricatum. *Flores* mediocres. *Sepala* subconniventia, posticum elliptico-lanceolatum, acutum, concavum, 1.5 cm. longum; lateralalia lanceolata, acuta, concava, carinata, 1.7 cm. longa; basi breviter connata. *Petala* erecta, lineari-lanceolata, acuta, 7 mm. longa, basi columnae adnata et breviter auriculata. *Labellum* recurvum, oblongum, subobtusum, 8 mm. longum, facie nitidum et glutinosum, basi auriculato-sagittatum et breviter sigmoideo-unguiculatum. *Columna* arcuata, subclavata, acutangula, 8 mm. longa, pede 3 mm. longo.

PERU. *L. Forget.*

Flowered with Messrs. Sander & Sons, St. Albans, in October, 1915. The flowers are tawny-yellow, more or less dotted with brown on the lateral sepals, and obscurely lined on the dorsal, with the front of the lip green, and two dusky lines extending down the sides to the slightly-auricled base. The locality is not quite certain, but it is believed to be one of M. L. Forget's Peruvian introductions.

433. *Eulophia Stewartiae*, Rolfe; ab *E. subintegra*, Rolfe, floribus majoribus, sepalis petalisque duplo latioribus valde differt.

Folia elliptico-lanceolata, acuta, 3-5-nervia, 30 cm. longa vel ultra, 5 cm. lata. *Scapi* crassiusculi, vaginis spathaceis subimbricatis obtectis. *Racemi* 7-12 cm. longi, multiflori. *Bractee* elliptico-lanceolatae, acuminatae, 2.5-3 cm. longae. *Pedicelli* crassiusculi, circiter 2 cm. longi. *Sepala* elliptico-lanceolata, acuta vel subacuminata, 3 cm. longa. *Petala* ovato-elliptica, subobtusata, 3 cm. longa, 2 cm. lata. *Labellum* subintegrum, ovatum, subacutum, fere 2 cm. longum, medio graciliter carinatum, supra basin cristam 4-lobam instructa; discus laevis; calcar clavatum, incurvum, 5 mm. longum. *Columna* 5 mm. longa.

S. AFRICA. Swaziland, at Hlalikulu, on marshy ground, *Miss M. M. Stewart* 41.

Flowers cream-coloured, with deep brown centre.

434. *Sigmatostalix costaricensis*, Rolfe; *S. Eliae*, Rolfe, affinis sepalis petalisque longioribus, et labello sagittato-cordato differt.

Pseudobulbi approximati, ovato-oblongi, compressi, acutanguli, 2-2.5 cm. longi, apice monophylli, basi 2-3-phylli. *Folia* oblongo-lanceolata, subacuta, 5-12 cm. longa, 1.2-1.6 cm. lata. *Scapi* graciles, 15-20 cm. longi, multiflori. *Bractee* ovato-lanceolatae, acutae, 3 mm. longae. *Pedicelli* 4 mm. longi. *Flores* parvi. *Sepala* et petala reflexa, lanceolata, acuta, 8-9 mm. longa. *Labellum* patens, unguiculatum, sagittato-ovatum, subconvexum, minute apiculatum, 6 mm. longum, 5 mm. latum; lobi laterales recurvi, 1 mm. longi; unguis 2 mm. longus; crista suberecta, dentiformis, subobtusata. *Columna* arcuata, 6 mm. longa, basi gracilis; alae subobsoletae.

COSTA RICA. *C. H. Lankester.*

Presented to Kew by Mr. C. H. Lankester, and flowered in the collection in October, 1915. The sepals and petals are greenish-yellow, with a large brown blotch about the centre, and the lip red-brown, with a deep yellow apex and margin.

435. *Gomphicis Traceyae*, Rolfe; a *G. alba*, Lehm. et Kränzl., planta fere duplo minoribus, foliis parvis et floribus multo majoribus differt.

Folia rosulata, lanceolata vel lineari-oblonga, subobtusata, 3-5 cm. longa, 0.8-1.5 cm. lata. *Scapus* 25-50 cm. altus, puberulus, vaginis 5-7 lanceolatis vestitus; racemus 4-6 cm. longus, densiflorus. *Bractee* ovatae, acutae, puberulae, 0.6-1 cm. longae. *Pedicelli* villosi, 5 mm. longi. *Flores* parvi, albo-

virescentes. *Sepala* 4-4.5 cm. longa, extus villosa; posticum elliptico-oblongum, obtusum, concavum; lateralia late oblonga, obtusa. *Petala* oblonga, subobtusa, 4 cm. longa, extus villosa. *Labellum* subtrilobum, conduplicato-plicatum, 4 cm. longum; lobi laterales oblongi, subobtusiusculi, membranacei; lobus intermedius brevis, subtruncatus, cum disco incrassatus. *Columna* clavata, 3 mm. longa. *Gomphicis alba*, Lehm. & Kränzl. in Engl. Jahrb. xxvi. p. 500, ex parte.

COLOMBIA. Paramo de Guanacas, near Popayan, 3000 m. *F. C. Lehmann* 6034. High Paramo near Bogota, 2450 m. *Mrs. J. A. Tracey* 107.

Two distinct species have been included under *Gomphicis alba*, Lehm. & Kränzl., and it is a little difficult to say as to which the description best applies. The stature and size of the leaves, however, agree with Lehmann's no. 7112, from the Western Andes of Cali, in the State of Cauca, at 1700-2000 m., and the name is therefore limited to it, while the other, which has much smaller leaves, and is identical with the plant collected by Mrs. Tracey, is called *Gomphicis Traceyae*.

436. ***Chloraea robusta***, Rolfe; affinis *C. viridiflorae*, Poepp., sed floribus majoribus, labello subtrilobo, ovato-oblongo, et cristis densis et crassioribus differt.

Herba 30-35 cm. alta, robusta. *Folia* lanceolato-oblonga, acuta, 5-10 cm. longa, 0.6-2.5 cm. lata, supra in bracteam acuminatam gradatim decrescentia. *Racemus* 7-12 cm. longus, 3-8-florus. *Bracteae* oblongo-lanceolatae, acuminatae, 3-4 cm. longae. *Pedicelli* 1.2-1.8 cm. longi. *Sepala* oblongo-lanceolata, 2.5-3 cm. longa; posticum acuminatum; lateralia obtusa et incrassata. *Petala* ovato-oblonga, acuta, 2-2.4 cm. longa. *Labellum* subtrilobo-integrum, ovato-oblongum, obtusum, 1.8 cm. longum, 6-8 cm. latum, margine crenulatum v. dentatum, facie fere omnino verrucosum. *Columna* clavata, 1.6 cm. longa.

CHILE. Sandy ridge above Baños de Chillan, 2300-2500 m., *H. J. Elwes*.

Allied to *C. viridiflora*, Poepp., but the lip is obscurely trilobed, and has more numerous, stouter crests than in Poeppig's figure, and in a single specimen at Kew that apparently belongs to it. Mr. Elwes remarks that it is very similar in colour and habit to *Chloraea grandiflora* and *C. Elwesii*.

437. ***Chloraea densiflora***, Rolfe; affinis *C. cylindrostachyae*, Poepp., sed floribus minoribus, et labello anguste oblongo nec pandurato differt.

Folia caulina late oblonga, subacuta, supra in bracteam acuminatam gradatim decrescentia. *Scapus* 50-60 cm. altus; racemus densus, multiflorus, 10-15 cm. longus. *Bracteae* lineari-lanceolatae, acuminatae, 2-3.5 cm. longae. *Pedicelli* 1.2-1.6 cm. longi. *Sepalum* posticum lanceolato-oblongum, incurvum, conduplicato-concavum, subacutum, 1.2 cm. longum; sepala lateralia linearia, subacuta, subfalcata, 1.2-1.4 cm. longa. *Petala* subspathulato-linearia, subfalcata, 1.2-1.4 cm. longa. *Labellum* integrum, anguste oblongum, obtusum, crenulatum, prope apicem

valde undulatum, 1-1.2 cm. longum; facie fere omnino dense papillosum. *Columna clavata*, 8 mm. longa.

CHILE. *Lake Quillen*, about 1200 m. *H. J. Elwes*.

"A tall green-flowered species." Radical leaves not seen. It has the general habit and appearance of *C. cylindrostachya*, Poepp., but the flowers are much smaller, and the lip scarcely half as broad and different in shape, while the other segments are also considerably narrower.

438. *Chloraea Elwesii*, *Rolfe*; affinis *C. magellanicae*, Hook. f., floribus majoribus, labello late ovato et lamellis crassioribus differt.

Folia elliptico-oblonga, subobtusata vel apiculata, 7-10 cm. longa, 2.5-3.5 cm. lata, supra in bracteam acuminatam decrescentia. *Scapus* circiter 30 cm. altus; racemus 2-4-florus. *Bracteae* oblongo-lanceolatae, acuminatae, 3-4 cm. longae. *Pedicelli* 1.2-1.6 cm. longi. *Sepala* ovato-lanceolata, subobtusata, 2.5-3 cm. longa, 1-1.2 cm. lata, reticulato-venosa. *Petala* elliptica, 2-2.2 cm. longa, 1.2-1.4 cm. lata, reticulato-venosa. *Labellum* integrum, ovatum, obtusum, 1.4 cm. longum, circiter 1 cm. latum, prope apicem crenulatum vel papilloso-fimbriatum, facie fere omnino valde papillosum. *Columna clavata*, 1.6 cm. longa.

CHILE. *Lolco Pass*, 1400 m., in large tufts under *Araucarias*. *Lolco* to *Lonquimay*, 1400 m., common at timber line. "Flowers handsome, green with black veins," *H. J. Elwes*.

Nearly allied to the Patagonian *C. magellanica*, Hook. f., and evidently its geographical representative, but the flowers are rather larger, the lip more broadly ovate, and the tubercles of the lip considerably stouter.

439. *Chloraea lotensis*, *Rolfe*; a *C. virescente*, Lindl., floribus minoribus, et labelli cristis multo minoribus differt.

Herba circiter 30 cm. alta. *Folia* radicalia marcida, caulina in bracteam acuminatam reducta. *Racemus* 7.5 cm. longus, circiter 12-florus. *Bracteae* lanceolatae, acuminatae, 1.8-2.5 cm. longae. *Sepala* oblongo-lanceolata, subobtusata, circiter 1.8 cm. longa; lateralia apice paullo incrassata. *Petala* elliptica, obtusata, 1.6 cm. longa, venis a basi ad medium varicosis. *Labellum* trilobum, 1.2-1.4 cm. longum, 1.2-1.4 cm. latum; lobi laterales oblongi, obtusi; lobus intermedius obovatus, disci venis fimbriato-ornatis. *Columna clavata*, 1 cm. longa.

CHILE. Dry hills above *Lota*, 180 m., *H. J. Elwes*.

Allied to *C. virescens*, Lindl., but with smaller flowers and the crests of the lip much smaller.

440. *Asarca tenuiflora*, *Rolfe*; ab *A. thermarum*, Phil., floribus minoribus, et labelli hypochilio bilamellato lamellis papillis clavatis instructis differt.

Herba circa 60 cm. alta. *Folia* oblonga vel elliptico-oblonga, subobtusata vel apiculata, 5-13 cm. longa, 2.5-4 cm. lata, supra in bracteam acuminatam subito decrescentia. *Racemus* 1 cm. longus, multiflorus. *Bracteae* lanceolatae, acuminatae, 2-3 cm. longae. *Sepala* lineari-lanceolata, acuminata, 1.2-1.4 cm.

longa; lateralia prope apicem paullo incrassata. *Petala* subovato-lanceolata, acuminata, 0.8 cm. lata. *Labellum* trilobum, 4-5 mm. longum; hypochilium late quadratum, circiter 3 mm. latum, 2-lamellatum, lamellis papillis clavatis instructis; epichilium elliptico-lanceolatum, obtusum, omnino papillis clavatis instructum. *Columna* lata, 3 mm. longa.

CHILE. Between Lolco and Lonquimay, in Araucaria forest, 1200-1400 m., *H. J. Elwes*. A single plant only found.

Allied to *A. thermarum*, Phil., but with smaller flowers, and the details of the lip different.

XV.—MISCELLANEOUS NOTES.

The Storm of Tuesday, March 28th, 1916.—During the last few years Kew has suffered somewhat severely in the loss of trees by storm. This has not been so much in the number of trees destroyed as in the individual interest of the trees themselves. The storm of March 28th will long be remembered for the damage done in the London district. In Kensington Gardens alone ninety-seven trees were uprooted. At Kew the damage was nothing like so extensive, and about twenty-five trees only—big and little—were blown down, but amongst them are several whose loss is greatly to be deplored.

First in importance was the fine cedar of Lebanon, second largest in Kew, which for more than 150 years grew close to the Temple of the Sun. It was one of a large number of trees transferred in 1762 to the then newly-founded Botanic Garden of Kew, by Archibald Duke of Argyll, from his famous collection at Whitton, near Hounslow. Three others of the same sending still remain, the Robinia, Turkey oak, and the persimmon. Its dimensions, taken from the fallen tree, were: height, 76 ft.; girth, 13 ft. 6 in. The tree was evidently sound and in good health. Many cedars in the country are considerably larger, but this tree was a notable one for the London district. So long as the consumption of coal in the metropolis is carried on in the present wasteful and dirty way it is not likely that trees so fine as the one we have lost will ever be built up there again.

In falling, the cedar crashed into the Temple of the Sun, swept it off its pedestal, and reduced it to a shapeless mass of timbers, laths and plaster. Built by Sir William Chambers in 1761 and probably completed about the time the cedar was planted, the two together have for many decades made one of the most attractive pictures in the landscape of Kew. Their conjunction has always been greatly admired—the white curving lines of the temple and the dark, horizontal limbs of the cedar enhancing each other's effectiveness. They have been depicted more than once by scene-painters on the London stage. It is a melancholy coincidence that, contemporaneous at the beginning and after 150 years' association, they shared a common doom.

Close by, another much smaller but also historical tree was destroyed. This was a specimen of the Minorca box (*Buxus*

balearica), a tree found wild in the Balearic Islands and the South-West of Spain. In 1837, Loudon mentioned it as being the largest tree of its kind within ten miles of London, and described it as 13 ft. high. The tree, which, according to Aiton, was introduced in 1780, grows extremely slowly. Nearly eighty years after its measurement by Loudon, it was only 25 ft. high, its trunk 2 ft. 7 in. in girth. Yet it was in perfect health and probably the finest of its kind in the British Isles.

A third tree of particular interest to British botanists, lost in the same hurricane, was a bay willow (*Salix pentandra*), which grew on the lawn due west of the Water Lily House (No. XV.). It was 50 ft. high, its trunk 7 ft. 9 in. in circumference—unusually large dimensions for this willow, which is one of the most distinct and handsome of British species. Its fragrant leaves, dark and lustrous, are more like those of bay laurel than the long, narrow, grey ones of typical willow.

The last of the famous group of elms known as the "Seven Sisters" came down, but it must in any case have been removed in a few years' time. These elms deteriorated very rapidly in recent years. As lately as 1883 the whole seven were in good health, and only two of them had broken tops, as may be seen in a fine drawing by Fitch in *Gardeners' Chronicle*, Sept. 15, 1883. There is an old eighteenth-century engraving in No. III. Museum in which they are shown standing near the margin of George III.'s lake, which was filled up about 1814.

Of the remainder of the trees that fell, few had more than ordinary interest. Near No. III. Museum a deodar was blown down. It was one of the numerous trees of this species that were planted by Sir William Hooker about 1845 at each side of the Broad Walk to form an avenue. Few of them succeeded, and latterly but few remained. This, the largest of them, was 64 ft. high and 8 ft. in girth of trunk.

The violence of the storm was most apparent in the northern part of the Gardens. The great extent of woodland to the south—one of Kew's most precious assets—suffered little, although many of the trees there have passed their zenith.

W. J. B.

The Seven Sister Elms.—In the previous note the destruction by wind of the last of this group of elms is recorded. It will be worth while for future reference to put on record the planting of seven others in their place, especially as the young trees are of interesting origin. They are *Ulmus campestris*, the common English elm, raised from seed sent to Prof. A. Henry in May, 1911, and collected from trees growing in the Royal Park of Aranjuez, on the Tagus, in Spain. Prof. Henry presented the plants to Kew in March, 1913. It is well known that the common elm rarely, if ever, produces fertile seeds in the British Isles, but reproduces itself freely by means of suckers. In low, warm situations in Spain, like Aranjuez, it ripens seed regularly, although, according to Prof. Henry, it does not do so in colder, more elevated places, such as Madrid and Toledo.

Of the elms at Aranjuez, Prof. Henry writes:—"The fact that these elms (and still older ones that previously existed in the Aranjuez Garden) were absolutely like the Windsor Park elms must continually have struck Ambassadors and other visitors from England to Spain, and may have given rise to Evelyn's story that the elms at Aranjuez, the Escorial, and other places belonging to the Kings of Spain were 'brought out from England' in the time of Phillip II. (see Evelyn's *Sylva*, p. 31, ed. ii.). I am inclined to believe that the English elm is really native of Spain, as it occurs in many localities (as a planted tree), and that our English elms are part of the Lusitanian flora. Their not producing seed may be due to the fact that the temperature of South Europe has lowered 4 deg. since neolithic times. It is, of course, remarkable that *Ulmus campestris* is totally absent from France."

On the date of planting (Feb. 9th, 1916) these young elms were 6 ft. or 7 ft. high. They are planted in approximately the same relative positions as the original "Seven Sisters," but about 10 yds. to the west.

W. J. B.

Botanical Magazine for April.—The plants figured are *Sophrolaelia Psyche*, Rolfe (t. 8654), a garden hybrid between *Laelia cinnabarina*, Lindl. and *Sophrontitis grandiflora*, Lindl.; *Clematis Pavoliniana*, Pampanini (t. 8655) from Central China; *Euonymus Bungeanus*, Maxim. (t. 8656), from Manchuria and N. China; *Lupinus Chamissonis*, Eschsch. (t. 8657), from California and *Alnus cordata*, Desf. (t. 8658), a native of Italy and Corsica.

Nomina nuda published by C. Moore.—The following notes and identifications of certain *nomina nuda* published by the late Mr. C. Moore in his Catalogue of Plants in the Sydney Botanic Gardens, 1895, and hitherto omitted in the Index Kewensis, have been kindly supplied by Mr. J. H. Maiden, the present Director.

Araucaria elegans, C. Moore, l.c. 88 (New Caledonia) = *A. Balansae*, Brongn. & Gris. See Agric. Gaz. N. S. Wales, vol. xviii. p. 906 (1907).

Araucaria anitense [sic], C. Moore, l.c. (Aneitum, New Hebrides) = *A. Cookii*, R. Br. var. *rigida*, Hort.

Dammara pumila, C. Moore and D. spinulosa, C. Moore, l.c. 89 (New Caledonia).—These species appear to be identical. They have not yet coned in the Botanic Gardens, Sydney, and have therefore not been identified.

Euphorbia compacta, C. Moore, l.c. 81 (Polynesia) = *E. nerifolia*, Linn. var. *compacta*, Hort.

Ficus habrophylla, C. Moore, l.c. 84, is an error for the following:—

Ficus habrophylla, G. Bennett, Gatherings of a Naturalist in Australasia, p. 341 (1860), nomen; Seem. Fl. Viti. p. 248 (1865), descr. A native of Tana Island, New Hebrides. According to Bennett, the fruit when ripe is of a purplish-red colour and excellent for tarts and preserves.

Flindersia Greavesii, C. Moore, l.c. 16 = *F. australis*, *R. Br.* See Maiden, Forest Fl. N. S. Wales, vol. ii. p. 151 (1905).

Meryta undulata, C. Moore, l.c. 43 (Polynesia).—This species has not been identified hitherto.

Randia macrophylla, C. Moore, l.c. 47 = *R. stipularis*, *F. Muell.* Descr. Notes Papuan Pl. vol. i. p. 69, in obs.—*R. stipulosa*, *F. Muell.* Fragm. vol. vii. p. 47 (1869), non *Miq.* (1856).
M. L. G.

Teak in Trinidad.—The following note on the growth of Teak in Trinidad has been received from Mr. C. S. Rogers, Forest Officer, Trinidad and Tobago, with some interesting photographs, showing the remarkable size of the leaves and the vigour of the young trees:—

East Indian Teak, *Tectona grandis*, was first introduced into the plantations in the Forest Reserves in Trinidad in 1913.

The seeds were obtained from the Tharawaddy, Burma, through the courtesy of the Conservator of Forests, Pegu Circle.

In 1913 about $14\frac{1}{2}$ acres were planted; $2\frac{1}{2}$ acres being situated in the Southern Watershed Reserve, about 7 acres in the Arima Reserve, and 5 acres in the Central Range Reserve. In each locality the original forest containing no marketable timber of any consequence was felled, burnt, and lined out with stakes or pickets at 10 ft. by 10 ft.

So far the best results have been attained in the Central Range Reserve Plantation where 5 acres were planted 10 ft. by 10 ft. Of the 2178 pickets, 35 were on unplantable ground, the remaining 2143 were sown with Teak seeds in July (18th to 24th). The sowing was rather late owing to the impracticability of getting the area ready at an earlier date. In the following January (1914) 1339 pickets, at which seeds had not yet germinated, were re-sown.

At the end of March, 1914, 1758 Teak seedlings had resulted, and some of them were 6 to 10 ft. high. In the following wet season the blank pickets were again re-sown. At the end of March, 1915, when stock was taken it was found that there were only 12 blanks.

Some of the plants had attained a height of 23 ft., and leaves were measured up to 36 in. in length by 25 in. in width, the Teak being then between 20 to 21 months old from the date of sowing the seeds.

In October, 1915, a tree was measured and found to be 32 ft. high with a girth of 2 ft. at ground level, and $16\frac{1}{2}$ in. at 3 ft., and $14\frac{1}{2}$ in. at 5 ft. from the ground. Its age was 2 years and $3\frac{1}{2}$ months from date of sowing.

The soil is a sandy loam of Tertiary origin. The elevation does not exceed 1000 ft. The original forest contained some trees of large size, but the more valuable species had been cut out, and the remainder were for the most part unsaleable owing to distance from a market.

The normal rainfall for the district is about 115 in., but during the last two years it has been 20 per cent. below the average.

Tarrietia utilis.—As the result of a re-examination of the seed of *Heritiera utilis** it seems desirable to transfer this species to the genus *Tarrietia*. Bentham and Hooker's classification† of the genera of *Sterculiaceae* was based on the arrangement of the anthers and the presence or absence of albumen in the seed, irregularly crowded anthers and albuminous seeds being stated by them to be characteristic of *Sterculia* and *Tarrietia*, whilst anthers arranged in a single ring and exalbuminous seeds were ascribed to *Cola* and *Heritiera*. There seems reason to believe that the division thus established does not correspond with the natural inter-relationships of these genera. The character of the annular or irregular arrangement of the anthers is very misleading, as there is great variation in this respect within the limits of a single genus, certain species of *Sterculia* (e.g., *S. foetida*) and *Tarrietia* having the anthers distinctly arranged in a ring, so that, as far as the flowers are concerned, they might be taken for species of *Cola* and *Heritiera* respectively. A more natural grouping would be to associate on the one hand *Sterculia* and *Cola*, which have pluri-ovulate carpels and follicular fruit, and on the other hand *Tarrietia* and *Heritiera*, which have uni-ovulate carpels and indehiscent sycamore-like samaras.

The seed of *Heritiera utilis* separates readily into two equal parts which have all the appearance of cotyledons, but on examining a transverse section each cotyledon is seen to have outside it a thick layer of albumen of exactly the same length and breadth, and to which it is so closely applied that the seed has the appearance of being exalbuminous with thick plano-convex cotyledons. It may, perhaps, be questioned whether the single character of the presence or absence of albumen is sufficient to warrant the recognition of *Tarrietia* and *Heritiera* as independent genera, and the further question arises as to whether *Argyrodendron* is not generically distinct from the former. Until the genera of *Sterculiaceae* have been monographically revised, however, it will be convenient to take the presence of albumen as distinguishing *Tarrietia* from *Heritiera*, and the name *Tarrietia utilis*, Sprague, is, therefore, proposed for *H. utilis*.

Tarrietia utilis was discovered in the Gold Coast Colony by Mr. H. N. Thompson, and was described in 1908.‡ The specimens collected by Mr. Thompson bore unifoliate leaves only. In the following year the species was described independently from Ivory Coast specimens by Dr. A. Chevalier, under the name *Cola proteiformis*,§ the specific name being given in allusion to the polymorphy of the leaves, simple, trifoliate and digitate leaves occurring on the same individual and sometimes even on the same branch.|| Gold Coast specimens with unifoliate, trifoliate and septemfoliate leaves were received from Mr. T. F. Chipp in 1912. Finally in January of the

* Kew Bull. 1909, p. 348; H. N. Thompson, Gold Cost, Report on Forests, t. 3.

† Gen. Pl. vol. i. p. 215.

‡ Kew Bull. 1908, p. 257. (*Triplochiton utile*.)

§ Vég Ut. Afr. Trop. Franç., vol. v. p. 250 (1909).

|| l.c. vi. p. 60, fig. 9.

present year the known distribution of *T. utilis* was extended to Sierra Leone by the receipt of specimens from Mr. C. E. Lane-Poole, accompanied by some interesting notes which may be summarised as follows:—

Heritiera utilis is a large forest tree, common throughout the Colony and Protectorate. The roots are intermediate in character between the "buttress" and "prop" types, resembling the former in being flat, and the latter in that they raise the tree clear of the ground.* The timber is light and very easily worked, and takes a fine polish which shows up the grain very well. It has many names, the most common creole one being "Hamon," probably a corruption of Almond; it is also called "Red Cedar," which is a better name. The Mendis call it "Yawi," and hold it in high esteem. In the old days it was used for shingles, and the old records of Waterloo contain pages of complaints in regard to the shingling of the manager's house. It appears that it had to be renewed every five years.

Young seedlings up to a year old bear simple (unifoliolate) leaves only. From that time onwards until the tree flowers the leaves produced are digitate, but those of the flowering shoots are again simple.

Mr. Lane-Poole's remarks on the nature of the leaves carry the more weight in that they were based on continued observation of the young trees in the nurseries and plantations under his charge. Dr. Chevalier, whose notes were based on wild trees, states that certain branches bear simple leaves only, and others leaves with three, four or five leaflets, whilst yet other branches bear leaves of all these forms. A flowering specimen received from him in 1911 bears simple leaves only.

He describes *T. utilis* as a tree 80–100 ft. high, with a clear trunk 50–65 ft. high and $1\frac{3}{4}$ – $2\frac{1}{2}$ ft. in diameter. The bark is reddish-gray, thick, with longitudinal cracks. The wood is red, of the same colour as mahogany, with a well-marked silver grain, moderately hard, density 0.583. It might serve as a substitute for mahogany, especially if it could be put on the market at less than 40 francs per ton.†

The distribution of *Tarrietia utilis*, as far as at present known, is as follows:—

SIERRA LEONE. Babadoori Valley, Lane-Poole 399. IVORY COAST. Alépé, Chevalier 16232;‡ Azagué, Chevalier 22293. GOLD COAST COLONY. Hunisu, Thompson 1; Imbraim, Thompson 25; Wassidimo, east of Bensu, Chipp 210; evergreen forest, Ajakwa, north of Chama, Chipp 204.

VERNACULAR NAMES. Sierra Leone: Hamon, Red Cedar, Yawi (Mendi). Ivory Coast: Kouanda (Attié), Gniangon (Agni), Kokotsi (Fanti). Gold Coast: Nyankom.

T. A. S.

* A good illustration of the buttress roots of *Tarrietia Argyrodendron* (Queensland and N.S. Wales) is given in Queensl. Agric. Journ. vol. ii., p. 154.

† Vég. Ut. Afr. Trop. Franç. vol. v., p. 250 (1909). The price mentioned applied to the market conditions in 1908–09.

‡ Vég. Ut. Afr. Trop. Franç. v. p. 250.

Oil-bearing Nuts of the Philippines.—In a recently issued Commerce Report of the United States of America some particulars are given of two oil-producing seeds of the Philippine Islands known respectively under the vernacular names of *Calumpang* or *Kalumpag* and *Balucanag*. The first-mentioned is apparently the seed of *Sterculia foetida* (*Sterculiaceae*), a tall tree, widely distributed in the Tropics. The seeds have been analysed by the Philippine Bureau of Science and found to be edible though slightly purgative when eaten in quantities. The composition of the kernels is: fat (by extraction of dry seeds), 51.78 per cent.; protein ($N \times 6.25$), 21.61 per cent.; starch, 12.10 per cent.; sugars, 5 per cent.; cellulose, etc. (by difference), 5.51 per cent.; ash, 3.90 per cent.

The oil expressed from the *Calumpang* is sweet, with a comparatively high melting point. Its colour is a light yellow. One chemist reports that it appears to resemble olive oil very much in its physiological action. It is nontoxic and has no irritating action. It can be used in the same manner as olive oil and should be especially useful for culinary purposes.

According to Hooper in *Agricultural Ledger* No. 5, 1912, the average weight of the seeds is 2.4 grams. They are formed of an outer parchment-like skin, violet or purplish in colour. Below the skin is a dark fleshy pulp. The kernels are whitish and have a pleasant taste and yield a bland, light yellow, non-drying oil used in Java for culinary purposes and as a burning oil.

Differences have been noticed between the kernel oil and that extracted from the whole seed. The kernel oil is liquid and slightly viscous. With the Halpen test it gives a cherry-red colour. The oil obtained from the whole seed is similar to that of the kernel oil, but deposits white fats at the ordinary temperature. A peculiar property of the whole-seed oil, first observed by Wedemeyer, is its behaviour on heating to 240° to 245° when it is suddenly converted, with spontaneous generation of heat, into an india-rubber-like solid substance, no doubt due to a process of polymerisation similar to that which occurs with castor oil.

Small quantities of these seeds have occasionally been imported into this country but do not appear to have found a market. In the Philippines a decoction of the leaves is used as a wash in suppurative cutaneous eruptions and the astringent fruit is employed in Java as an injection in gonorrhœa and in Western India as an article of diet.

The other oil-bearing nut referred to is the "*Balucanag*" (*Chisochiton cumingianus*), belonging to a genus of trees and shrubs of *Meliaceae*, confined in distribution to the Eastern Tropics. The nut has also been under investigation by the Bureau of Science. The nut is known in many parts of the islands, from Northern Luzon to Southern Mindanao. The name "*Balucanag*," applied to it in Camarines and Laguna, is taken to indicate that the natives recognise the nuts as oil-bearing, for the same name is applied to another and well-known oil-bearing nut, although the two are not alike in any other particular. [See *Kew Bull.*, 1906, p. 119.]

The seed of *Chisochiton cumingianus* is described as half-ellipsoidal in shape, when fresh, and as averaging 3 cm. in length, and 2.5 cm. in width at the widest portion. The shell is rather hard, constituting about 60 per cent. of the total weight, and it is difficult to separate it from the contents. In a quantity of shelled nuts tested by the Bureau of Science, petroleum ether being used for the purpose, about 31 per cent. of the whole nut was a reddish-brown oil. The composition of the dry kernels was found to be as follows: fat (by extraction), 44.12 per cent.; protein ($N \times 6.25$), 9 per cent.; ash, 3.19 per cent.

The dry kernel yielded 35.56 per cent. of oil on expression. The oil had a rancid odour and was non-drying. On experiment it was found to have purgative properties. This oil, however, was found to have a weaker laxative effect than castor oil, five parts of it being approximately equivalent to one part of castor oil. This oil, more commonly called cato, was found to be valuable for soap-making, and a local firm now employs the oil in that industry.

J. M. H.

Ajowan (*Carum copticum*).—An annual Umbelliferous plant widely cultivated in India for the seeds which are valued for their medicinal properties. The seeds are of importance commercially as the source of Thymol, a well-known antiseptic.

The technical laboratory of the Department of Industries, United Provinces of India, has issued a circular advocating the manufacture of Thymol in India, stating that it can be undertaken without any difficulty where the raw material is so plentiful, and that very good samples have been obtained as a result of experiments conducted at the laboratory. The circular says in part: Thymol was sold before the war at five to six shillings per pound. The price rose enormously soon after the supplies from Germany were stopped, and not so long since was quoted at 30s. per pound. It is obvious that the manufacture of thymol in India at the present time should yield a good return. Even under normal conditions there appears to be no reason why thymol should not be made in India at least as cheaply as elsewhere, seeing that we have the raw material in our midst, and a small company has recently been established at Dehra Dun for its manufacture. The apparatus required is simple and inexpensive. The demand for thymol both in India and in Great Britain is great, and there should be no difficulty therefore in finding a ready market.

It may perhaps be recorded that from seeds of this plant forwarded from the Royal Gardens, Kew, to the Imperial Commissioner of Agriculture in the West Indies plants have been successfully raised in St. Lucia, growing to a height of 2 ft., and flowering freely. The present value of Ajowan seed in the London drug market ranges from 18s. to 24s. per hundred-weight.

J. M. H.